

NESA BULLETIN
January 1 - 15, 1939

Bulletin No. 13
International
Seismological
Centre

***** (January 1) *****

Weston

i 08 49 05

***** (January 4) *****

Harvard

iP₁ 21 09 53.4
iP₁P₁ 54.2
iF 10 06.2
iS₁ 07.3
iS₁S₁ 08.1
S₁ - P₁ = 13.9
Δ = 113.7 km. (71 mi.)
H = 21 09 34.4

Weston

iP₁ 21 09 54.5
i 55.8
i 10 01.0
iS₁ 08.8
iS₁S₁ 10.2
Δ = 120 km. (75 mi.)
Apparently a blast near Stafford
Springs, at Mass.-Conn. State line.

***** (January 4) *****

Fordham

i 21 55 39
i 52

***** (January 5) *****

Weston

i 01 28 55

i 01 30 02

***** (January 5) *****

Fordham

e 16 36 35

***** (January 5) *****

Weston

i 20 06 15
i 24

***** (January 7) *****

Weston

e 13 04 26

***** (January 7) *****

Fordham

i 18 36 29 i 19 39 02 e 21 30 04 i 21 44 10

***** (January 9) *****

Weston

iP₁ 17 09 33.0
i 34.0
i 34.5
i 42.8
iS₁S₁ 46.8
eL? 52.0

$\Delta = 105 \text{ km. (66 mi.)}$

eP₂ 17 09 35.5
eP₁ 36.3
iP₁P₁ 37.0
i 49.0
iF 50.7
iS₂ 51.5
iS₁ 52.3
eL 54.5
eR 56.0

***** (January 9) *****

Fordham

i 21 20 25 i 22 35 40

***** (January 10) *****

Weston

i 17 10 58 Possibly two separate disturbances.
i 11 51

***** (January 10) *****

Fordham

i 20 11 48

***** (January 15) *****

Ottawa

iP 01 29 15
iS 27.5
iL 32
F 30

$\Delta = 95 \text{ km. (59 mi.)}$
H = 01 28 58

Addenda to Previous NESA Bulletins

To Bulletin No. 10

***** (November 22, 1938) *****

Ottawa

i	14	43	01	i	16	21	30	i	16	24	08	i	17	03	50
i			02.2	i			31	i			09	i			51
F			12	F			35	F			17	F		04	14
i	19	06	38.3	i	19	59	47	i	20	56	44.5				
i			39.3	i			48	i			45.5				
F			47	F	20	00		F			57				

***** (November 23) *****

Ottawa

i	15	10	41	i	15	52	13	All the disturbances on this and the preceding day are similar in record characteristics; the only variation discernible is in the matter of amplitudes.
i			42	i			14	
F			49	F			26	

***** (November 26) *****

Ottawa

iP	07	48	27	$\Delta = 195$ km. (122 mi.) H = 07 47 57
i			28	
i			31.4	
i			33.8	
iS			49.5	
iL			56	
F	56			

To Bulletin No. 11

***** (December 15) *****

Williamstown

eP?	11	30	42	iP ₁	21	31	30.6
iS ₁		31	32	iS ₁			58.1

To Bulletin No. 12

***** (December 17) *****

Ottawa

i	15	48	29.5	Correction of times previously listed.	e	18	42	56.4
i			30.5		e			57
F		49			F		45	

***** (December 23) *****

Fordham

i	18	24	10
e		32	00
		44	
		48.5	

***** (December 30) *****

Williamstown

eP	19	02	39
e			43
iS ₁			46.4

***** (December 31) *****

Fordham

i	16	29	16	Dil.
i			28	

NOTICE From:

Fordham

Western Union reports a break in a cable on November 26, 12:50 a.m. (E.S.T.) at 51°15' N., 37°30' W. for which they cannot account.

Daniel Linehan, S.J.

NISA BULLETIN

January 16 - 31, 1939

Bulletin No. 14



***** (January 17) *****

Fordham

i 19 00 22 Blast?
i 33
i 40.5 max.

Weston

i 19 01 37.1
iL 38.2

***** (January 17) *****

Fordham

i 19 16 37.5 Blast?
i 43.8
i 44.5 max.

Weston

iL 19 17 54.5

***** (January 18) *****

Weston

i 01 55 36
i 53

Harvard

i 01 55 36.9

***** (January 18) *****

Fordham

i 01 55 26.5 Dil. Deep focus.
i 45.0
i 53.0

i 19 42 35.0 Dil.
i 39.3

***** (January 18) *****

Harvard

iP₁ 21 29 42.7
iS₂ 30 02.4
S₁ 03.7
S₁S₁ 04.5
2(S₁S₁) 08.8

H = 21 29 14.1
Δ = 172 km. (107 mi.)

Weston

iS₁? 21 30 07.6
i 09.0

***** (January 21) *****

Harvard

(1) e 01 44 03
(2) e 01 48 40
(3) e 02 07.2

Weston

eS? 01 44 25
iS 01 48 35
eS? 02 07 12

Fordham

i 01 48 12
i 17

A group of three quakes. F - S = ca. 1^m50^s for Weston.

***** (January 21) *****

Fordham

i	21	29	52.9
i			57.4
i		30	04.3

***** (January 22) *****

Fordham

i	03	29	57.6
i		30	01.9
i			09.9

This and the preceding are new and practically identical.

***** (January 22) *****

Weston

i	11	02	30	Deep focus?
i			47	

***** (January 25) *****

Fordham

i	12	04	33
i			38
i			45

Microseisms are bad but the appearance is similar to disturbances of Jan. 21, 21^h and Jan. 22, 03^h.

***** (January 27) *****

Harvard

i	14	59	48
i	16	27	13
i	19	50	23

Weston

i	14	59	56
i	16	27	18
e	19	50	29
S ₁			31

***** (January 27) *****

Fordham

iP ₂	20	08	41.5
i			43.8
i			46.5
iS ₂		09	00.0
i			02.6
i			04.0

Δ = 155 km.
(97 mi.)

Harvard

iP ₂	20	08	44.9
iP ₁			46.0
i			58.7
eS ₂		09	05.2
i			06.3
iS ₁			07.2

H = H = 20 08 15.7
Δ = 175 km.
(109 mi.)

Weston

iP _n	20	08	47.2
iP ₂			48.0
iP ₁			48.7
iP ₁ P ₁			51.0
iS _n		09	07.5
i			10.0
iS ₂			10.8
iS ₁			12.0
i			19.2

Blast from Hudson, N.Y. (?)
Δ = 200 km. (125 mi.)

***** (January 28) *****

Harvard

Weston

e 16 01 55.6
iS₁? 58.3

iS₁? 16 02 03.5

***** (January 28) *****

Harvard

Weston

i 23 29 00 Deep focus i 23 29 01

***** (January 29) *****

Weston

Harvard

(1) i 13 43 33
(2) e 18 57 01
(3) i 19 47 00
(4) i 19 51 26
(5) i 20 09 04
(6)

e 19 51 32

e 20 09 52

A group of locals of which (5) is the largest but it is disturbed by a R.R. train. F - S in largest = 3 min. at Weston.

***** (January 31) *****

Ottawa

i 19 28 20
L 21.5
F 29

i 21 05 21.5
L 23
F 05.5

Daniel Linehan, S.J.

NESA BULLETIN

February 1 - 15, 1939

Bulletin No. 15

***** (February 1) *****

Weston

eP ₁	10	37	42
iS ₁			45.6
iL ₁			47
i			50
i2(S ₁ S ₁)			56

$\Delta = 29.5$ km. (19 mi.)

H = 10 37 37

***** (February 1) *****

Ottawa

i	15	13	46
i			47
iL			47.5
F			50

***** (February 1) *****

Fordham

i	21	35	28.7	i	23	31	55.2
i			32.2	i			59.6
i			36.7	i		32	07.8

***** (February 2) *****

Fordham

i	03	13	15.5	i	12	08	13.5	i	13	39	01.2	i	18	25	57.0
i			21.5	i			17.8	i			04.1	i		26	07.5
								i			06.6				
								i			16.5				

***** (February 3) *****

Fordham

i	04	30	47.0	i	13	03	20.5	i	16	14	15.0
i			52.2	i			24.5				
				i			42.5				

***** (February 3) *****

Ottawa

i	17	18	05
i			12
F		19	

***** (February 3) *****

Fordham

i 21 54 01.0

The local disturbances reported above from this station continue. Hereafter only initial impulses are reported, although the number of clear phases varies from two to five.

***** (February 4) *****

Fordham

i 03 33 51.2 i 09 47 15.5 i 15 35 52.5 i 22 35 47.2

***** (February 5) *****

Fordham

i 03 20 56.3

***** (February 6) *****

Fordham

i 21 50 19.5

***** (February 7) *****

Fordham

i 16 28 10.0 i 19 33 24.0

***** (February 7) *****

Weston

iP₁ 19 33 52.8
i 34 19.4
iS₁ 35

$\Delta = 346 \text{ km. (215 mi.)}$

***** (February 7) *****

Fordham

i 20 18 08.5 i 23 11 06.0

***** (February 8) *****

Weston

i 02 56 37
i 42
i 44.5
i 57 10
iS₁ 24

Preliminaries obscured by RR. train.

***** (February 8) *****



Fordham

i 11 57 34.0 i 12 03 56.0 i 17 37 04.5 i 23 59 09.7

***** (February 9) *****

Fordham

i 03 53 06.5 i 15 00 14.0 i 17 37 23.0

***** (February 11) *****

Ottawa

i 20 59 43
i 44
F 21 00

***** (February 13) *****

Weston

i 23 13 44 Appears on short period vertical only. Does not
look like Deep Focus.

***** (February 15) *****

Weston

i? 02 36 32 eS₁ 16 37 53
e 37 46
i 57
iS₁ 38 30

NOTICE: From: -

Weston

Correction to Bulletin No. 13, January 9.
The second group of phases starting
eP₂ 17 09 35.5
should be listed as coming from Harvard; $\Delta = 132.5$ km.
(83 mi.); H = 17 09 13.7

Daniel Linehan, S.J.

NESA BULLETIN

February 16 - 28, 1939

Bulletin No. 16



ADDENDA to Bulletin No. 15 (Most of the following reports were received at the Central Station in time for inclusion in the previous Bulletin, but were accidentally mislaid. Sincere apologies.)

***** (February 1) *****

Weston

Harvard

eP₁ 10 37 42
iS₁ 45.6
iL 47
i 50
i 2 (S₁S₁) 56

iS₁ 10 37 43.5
 $\Delta(S_1-H) = 22.4$ km. (14 mi.)
 $\phi = 42^\circ 38'$ N. ca.
 $\lambda = 71^\circ 22'$ W. ca.

$\Delta = 29.5$ km. (19 mi.)
H = 10 37 37

Near N. Chelmsford, Mass.

(The Weston readings are repeated from Bulletin No. 15)

***** (February 9) *****

Ottawa

iP 15 11 38.5
iS? 52.5
e 53
L 55
F 12.5

$\Delta = 110$ km. (69 mi.)
H = 15 11 20

***** (February 11) *****

Fordham

i 19 58 29.5
i 34.1
i 41.8

***** (February 12) *****

Fordham

i 02 04 10.7
i 23.0

***** (February 13) *****

Harvard

e 08 14 01 Deep?

***** (February 13) *****

Fordham

i 18 43 06.0
i 19.5

i 22 22 44.5

***** (February 13) *****

Harvard

i 23 13 43

Fordham

i 23 13 56.5
i 14 06.3 Deep focus

***** (February 14) *****

Fordham

i 16 52 47.0

***** (February 14) *****

Fordham

iP₁ 19 13 03.7
i 20.0
iS₁ 23.2
iS₁S₁ 24.0 max.
Δ = 158 km. (99 mi.)

Harvard

iP₁? 19 13 10
e 33
iS₁ 34

Weston

eP₁ 19 13 11
i 16
iS₁ 36

Δ = 196 km. (123 mi.) Δ = 205 km. (128 mi.)
H = 19 12 37 Quarry blast near Hudson, N.Y. (?)

***** (February 15) *****

Fordham

i 02 21 46.0
i 52.6

i 08 50 32.0
i 39.0

***** (February 16) *****

Ottawa

i 17 06 37.5
L 07 02
F 07.4

***** (February 17) *****

Fordham

i 21 13 31.5 S phases of distant local?
i 38.3
i 45.6

Weston

i 21 14 39

***** (February 18) *****

Fordham

i 11 01 53 Deep focus or distant teleseism.

***** (February 19) *****

Fordham

i 13 02 53.0
i 03 12.0

Weston

i 13 03 04.3
i 23.1 Body phases of tele-
i 31.0 seism.

***** (February 20) *****

Fordham

iP₂ 23 10 50.0
i 51.8
iS₂ 11 06.6
i 09.5
i 10.0 max.
 $\Delta = 138$ km. (87 mi.)

Weston

eP? 23 11 31
e 12 00
iS₂ 05.5
iS₁ 19.5

***** (February 23) *****

Fordham

i 19 02 12.9
i 15.7

Weston

e 19 03 15
eS₁ 20

***** (February 24) *****

Fordham

i 00 32 15.5?
i 19.5

Weston

i 00 32 46
iS₁ 50

***** (February 24) *****

Weston

iS₁ 13 22 59

***** (February 25) *****

Weston

iS₁ 13 10 34

iS₁ 13 29 27

iS₁ 13 44 14

iS₁ 13 58 32

iS₁ 14 21 09

***** (February 26) *****

Weston

e 12 19 02

eS₁ 12 23 06

***** (February 28) *****

Weston

e 13 31 45

***** (February 28) *****

Ottawa

L 17 44.6
F 45.

Daniel Linehan, S.J.

NESA BULLETIN

March 1 - 15, 1939

Bulletin No. 17

***** (March 2) *****

Ottawa

e 21 08 11
e 37
F 09.5

***** (March 2) *****

Fordham

iP_n 21 05 45.2
i 26.7
i 30.0
iS₁ 32.5
i 33.5
 $\Delta = 314$ km. (197 mi.)

Weston

iP_n 21 05 51.2
iP₂ 54.0
iP₁ 59.5
iS_n 06 29.5
iS₂ 36.5
iS₁ 44.5

Williamstown

iP_n 21 06 02.4
iP₂ 12.2
iS₂ 07 00
i 02
i 04

$\Delta = 365$ km. (228 mi.) $\Delta = 465$ km. (290 mi.)
H = 21 05 00.5 $\phi = 39.2$ N. $\lambda = 70.5$ W.

***** (March 4) *****

Ottawa

i 18 53 33
i 34
F 50

i 20 05 59.5
i 06 01
F 10

***** (March 5) *****

H = 15 12 22

Cf. Supplement to this Bulletin.

***** (March 7) *****

H = 11 21 35

Cf. Supplement.

***** (March 7) *****

Ottawa

e 18 27 02
e 10.5
F 45

***** (March 7) *****

Williamstown

iP₁ 21 09 10.6
i 12.8
iS₁ 20.2
iS₁S₁ 22.2
i 26.6

Δ = 78 km. (49 mi.)

Harvard

iP₁ 21 09 15.6
i 27.5
iS₁ 28.5

Δ = 105.5 km. (66 mi.)
Prob. blast ca. φ = 42° 04' N.
λ = 72° 42' W.

H = 21 08 58.0

Weston

iP₁ 21 09 16.8
iP₁P₁ 17.7
i2P₁P₁ 19.2
i 22.7
iS₁ 30.2
i 32.2

Δ = 110 km. (69 mi.)

***** (March 7) *****

H = 22 11 20

Cf. Supplement.

***** (March 8) *****

Fordham

i 21 08 02

***** (March 9) *****

Fordham

i 05 41 47

***** (March 9) *****

Weston

i 13 31 34

***** (March 10) *****

Weston

i 00 02 01

***** (March 11) *****

Ottawa

P_n 01 15 10
P* 18
S_n 55
S* 16 06.5
F 17

Δ = 415 km. (259 mi.)
H = 01 14 11.6

***** (March 13) *****

Ottawa

i	23	00	51.5
i			52.5
F	01		

Supplement to Bulletin No. 17

According to NESA No. 11 data on the disturbances of December 1st, 1938, were to be presented at a later date. A study of this quake from the original grams has been made at Weston. The grams were generously loaned Weston by Fordham, Williamstown, Harvard, and Ottawa. On first sight the grams would contain three separate disturbances, although there was difficulty in attempting to distinguish the "P" and "S" groups in each respective disturbance.

During March three other like combinations have appeared where a single station might interpret each combination to be composed of several locals, but which at the Central Station the conglomerate of readings would indicate quakes of 10° - 30° distance with neither surface waves nor any phase over a period of 1 sec. The multiplicity of phases as well as the continued short period is confusing. They do not seem to be deep focus phases after inspection of the three components at Harvard and Weston, yet they do not follow normal travel time curves as precisely as one might desire. The three stronger quakes show the first and second group of phases fairly close together and a third group arriving later. This latter group may or may not be a part of the quake, but the fact of its recording each time and standing alone eliminates the idea of its being a separate disturbance.

The first of these groups has been designated as Pn and the second as Sn, the third as "e". A motive for calling the second Sn is the evident polarity of the group from the Harvard and Weston grams. The azimuth for all four quakes is a general N-S one from the late arrival of "P" and early "S" on the EW component. The priority of reception at Fordham would place the epicenter to the South. Macelwane's Tables were used to determine distance and time at origin.

The four quakes are given here for comparison, and a brief explanation of the three in March according to the Weston grams. The quake of December 1st is explained according to the grams of the NESA stations loaned Weston. For brevity only Pn and Sn are generally given.

***** (December 1) *****

A sharp "i" phase (here designated as i(P)) began this quake at all stations excepting Fordham. Using the azimuth ultimately determined and the Weston-Ottawa distance, the velocity of i(P) = ca. 14 km/sec., which is too great. Using the same azimuth-distance the velocity of P_n = ca. 7.8 km/sec. or Jeffreys' value. The true angle of emergence of i(P) at Weston = 53° (where V/v = 1.8) and is not consistent with the following phases which appear to be of shallow origin. The high velocity, the angle of emergence and lack of impulse at Fordham, the nearest station to this group of epicenters, suggest the relation of i(P) to another quake. Although listed below with station readings it has been used in computing Δ. The only other station reporting a phase at this time is Riverside at 23 32 52.

<u>Fordham</u>	<u>Weston</u>	<u>Harvard</u>
iP _n 23 29 34	i(P) 23 29 21	i(P) 23 29 22
eS _n 33 45	eP _n 23 29 45	eP _n 23 29 46
	eS _n 34 00	eS _n 34 00
Δ = 23°1	Δ = 23°5	Δ = 23°5
<u>Williamstown</u>	<u>Ottawa</u>	
i(P) 23 29 28	i(P) 23 29 58	
eP _n 23 29 55	eP _n 23 30 46	φ = 22° N. λ = 58° W.
eS _n 34 18	eS _n 35 17	H = 23 24 40
Δ = 24°2	Δ = 28°5	

***** (March 5) *****

Polarity of "S" group evident from early arrival at Weston on EW. A group of surface waves seems to accompany this quake, but their long period suggests a greater distance. An emergent phase on the Z sp at Weston at 14 46 55 might be the preliminary to these and would make it an 80°-90° quake.

<u>Fordham</u>	<u>Weston</u>	<u>Harvard</u>
iP _n 15 16 09	eP _n 15 16 21	eP _n 15 16 24
iS _n 19 11.0	eS _n 19 39	eS _n 19 43
	e 35 00	e 34 59
Δ = 15°6	Δ = 17°2	Δ = 17°4
<u>Williamstown</u>	<u>Ottawa</u>	
iP _n 15 16 29	iP 15 17 00	
iS _n 19 50	i 17 10	φ = 25° N. λ = 73° W.
	e 21 16	H = 15 12 22
Δ = 17°5	20°4 meas.	

***** (March 7) *****

No long period waves. This is the weakest of the four here considered, and it is doubtful if the more distant stations even recorded it. It presents the same general characteristics of the others.

Fordham

iPn 11 26 05
iSn 29 49

$\Delta = 20^{\circ}1$

Weston

ePn 11 26 15
iSn 30 04

$\Delta = 20^{\circ}6$

H = 11 21 35

***** (March 7) *****

No long period waves. "P" and "S" arrived about the same time on all components at Weston, but again the EW showed "i" phases and greater amplitudes for the "S" despite the lower magnification of this component in present operation.

Fordham

iPn 22 15 55.8
iSn 19 42.0

$\Delta = 20^{\circ}3$

Weston

ePn 22 16 06.5
eSn 20 01.5
e 39 24

$\Delta = 21^{\circ}3$

Harvard

ePn 22 16 10
eSn 20 06
e 39 28

$\Delta = 21^{\circ}4$

Williamstown

iPn 22 16 16.6
eSn 20 19.0

$\Delta = 22^{\circ}1$

Ottawa

ePn 22 17 00
eSn 21 25

$\Delta = 24^{\circ}7$

$\phi = 22^{\circ} \text{ N}, \lambda = 62^{\circ} \text{ W.}$
H = 22 11 20

It is usually not the purpose of NESAs to determine epicenters so far outside its territory, and the readings of the March 5th and 7th quakes were forwarded to the USCGS in Washington. Up to the time of this publication no other data had reached them and they were awaiting reports from their Porto Rico station which is nearest the NESAs epicenters.

Daniel Linehan, S.J.

NESA BULLETIN



March 16 - 31, 1939

Bulletin No. 18

***** (March 16) *****

<u>Ottawa</u>	<u>Weston</u>	<u>Harvard</u>
iPn 20 21 29	i 20 22 24	S ₁ 20 23 50.4
iP* 31	eS 23 47	i 54.7
iSn 50	iS ₁ 24 00	i 56
iS* 52		i 58.7
iL 53		
F 20 26	$\Delta = 621 \text{ km. (387 mi.)}$	$\Delta = 595 \text{ km. (372 mi.)}$
	from S ₁ - H	from S ₁ - H
H = 20 21 01	ca. 75° W.	
$\Delta = 178 \text{ km. (111 mi.)}$	46°5 N.	

***** (March 20) *****

<u>Fordham</u>	<u>Weston</u>	
i 21 14 01.3 Dil.	iP ₂ 21 14 19.2	
i 19.7	iP ₁ 20.2	$\Delta = 175 \text{ km. (109 mi.)}$
i 22.1	eS ₂ 40.3	H = 21 13 51.2
i 23.0	iS ₁ 41.5	

***** (March 22) *****

<u>Ottawa</u>
i 19 15 24
i 28
F 15.7

***** (March 22) *****

<u>Fordham</u>	<u>Weston</u>
i 21 06 27	iS ₁ 21 07 21.2
	i 25

***** (March 23) *****

<u>Fordham</u>			<u>Williamstown</u>			<u>Weston</u>		
iP ₁	15 10	52.0	iP	15 11 00		iP ₂	15 11	02.0
i		53.2	iS		18.7	P ₁		03.1
i		54.4				2(P ₁ P ₁)		04.6
iS ₁	11	06.0	$\Delta = 160$ km. (100 mi.)			iS ₂		22.2
i		08.0				iS ₁		23.2
						2(S ₁ S ₁)		27.3
						L		33.0
$\Delta = 115$ km. (72 mi.)						$\Delta = 171$ km. (106 mi.)		
						H = 15 10 34.5		
						Blast at N. Branford,		
						Conn., 41°20' N.		
						72°47' W.		
<u>Harvard</u>								
eP ₂	15 11	01.8						
iP ₁		02.6						
S ₂		21.1						
iS ₁		30.8						
$\Delta = 165$ km. (103 mi.)								

***** (March 23) *****

<u>Fordham</u>			<u>Weston</u>		
i	21 49	37	eS ₁	21 50	21

***** (March 26) *****

<u>Ottawa</u>					
iP	12 00	52.5			
iS		56.5	$\Delta = 33$ km. (21 mi.)		
F		01.2	H = 12 00.8		

***** (March 27) *****

<u>Weston</u>			<u>Harvard</u>		
iS	00 42	52	Activity apparent during		
S		43 09	preceding minute but		
max.			beginning uncertain.		
			e	00 42	54

***** (March 27) *****

<u>Fordham</u>			<u>Harvard</u>			<u>Weston</u>		
i	16 02	57	e	16 03 35	Activity earlier	i	16 03	56.5
			S ₁ ?	04 05	but beginning	iS		58
					uncertain	iS ₁	04 09	

***** (March 30) *****

Fordham

iP₁ 16 13 49.5
iS₁ 14 00.3
i 03.0 max.

NOTICE FROM:

Weston : The epicentres given in the Supplement to Bulletin No. 17 have been verified by readings from the Puerto Rico station, courtesy of the U. S. Coast and Geodetic Survey. The quakes of March 5th, 15th hr.; March 7th, 11th hr.; March 7th, 22nd hr. (this latter felt locally at Caguas, P.R.) A second quake on March 7th, 11th hour was superimposed on the previous shock.

Data on the December 1st quake had been requested from the Coast and Geodetic Survey by the Central Station.

Daniel Linehan, S.J.

NESA BULLETIN

April 1 - 15, 1939

Bulletin No. 19



***** (April 1) *****

Fordham

i 18 19 57.5
i 20 10.2

Weston

iS₁ 18 21 12

***** (April 1) *****

Williamstown

iP 22 30 25.4
iS 41.2
i 43.5

Harvard

iP₂ 22 30 27.5
iP₁ 28.5
iP₁S₁ 32.0
iS₂ 45.0
iS₁ 46.0

Weston

iP₂ 22 30 27.9
iP₁ 28.9
eS₂ 45.4
i 46.1
L 56.6

Fordham

i 22 30 48.8

$\Delta = 144.4$ km. (91 mi.) $\Delta = 146$ km. (92 mi.)
Blast at Meriden, Conn.
H = 22 30 04.2

***** (April 2) *****

Weston

i 20 08 05 Dil to South
i 12 10 Micros very bad
Appears to be a 22.4° quake.

Harvard

iS₁? 20 12 24

***** (April 3) *****

Fordham

i 20 07 49 S phases of distant local?

***** (April 4) *****

Ottawa

e 18 02 14
i 21
F 02.9

***** (April 7) *****

Fordham

i 16 25 32 S phases of distant local?

***** (April 8) *****

Williamstown

iP₁ 13 39 10.9
iS₁ 20.7
 $\Delta = 80$ km. (50 mi.)

Weston

iP₁ 13 39 21.8
iS₁ 36.5
 $\Delta = 122$ km. (76 mi.)
H = 13 39 01.6

Fordham

i 13 39 46

***** (April 12) *****

Weston

iS₁ 02 03 52

***** (April 12) *****

Ottawa

i 16 54 38
i 38.8
F 55

i 19 35 30
i 30.8
F 36

***** (April 13) *****

Fordham

iP₂ 01 57 33
iS₂ 58
 $\Delta = 210$ km. (131 mi.)

Weston

eP₁ 01 57 45
iS₁ 58 07.5
 $\Delta = 185$ km. (115 mi.)

Tines do not agree for common H

***** (April 13) *****

Ottawa

i 19 09 09
i 09.8
i 10.5
F 09.5

***** (April 13) *****

Fordham

iP₂ 22 15 08.7
iP₁S₁ 12.8
i 23.5 $\Delta = 140$ km.
iS₂ 25.4 (88 mi.)
i2(S₁S₁) 30.1 max.

Weston

iS₁ 22 16 40

Daniel Linehan, S.J.

NESA BULLETIN

April 16 - 30, 1939

Bulletin No. 20

Addenda to Bulletin No. 19

***** (April 8) *****

Harvard

iP 13 39 19.6
iS 32.6 $\Delta = 106$ km. (66 mi.)

***** (April 13) *****

Harvard

iS₁ 01 58 04

***** (April 17) *****

Fordham

i 20 10 25

***** (April 18) *****

Weston

eS₁ 17 27 09

***** (April 20) *****

Fordham

i 16 31 35

***** (April 20) *****

Fordham

iP₁ 20 00 20.3
i 21.4
iS₁ 33.0
i 38.8
 $\Delta = 104$ km. (65 mi.)

Blast at N. Branford,
Conn.

Williamstown

e 20 00 27.4
iP₁ 28.8
iP₁S₁ ? 31.3
e 45.7
iS₁ 46.2
i? 50.0
 $\Delta = 159$ km. (99 mi.)
H = 20 00 02

Weston

eP₂ 20 00 29.3
iP₂ 29.6
iP₁ 30.5
2P₁P₁ 32.0
iS₂ 49.5
iS₁ 51.0
 $\Delta = 173$ km. (108 mi.)
from S₂ - P₂

***** (April 21) *****

<u>Fordham</u>			<u>Weston</u>		
i	19 02	14.0	iS ₁	19 03	47
i		15.5			
i		16.8			
i		34.0			

***** (April 23) *****

<u>Fordham</u>			<u>Weston</u>		
e	17 34	06	eP	17 34	07
e		37 42	eS		38 11

This is a 22° quake of the same type mentioned in the Supplement to Bulletin No. 17. Two others occurred earlier this month.

***** (April 24) *****

Fordham

i	15 58	57
i		59 01

***** (April 25) *****

<u>Ottawa</u>								
i	18 57	31.5	i	21 28	46.5	i	22 34	01
i		32	i		47	i		02
i		32.5	i		47.5	F		34.2
F	57.8		F	29				

***** (April 27) *****

<u>Fordham</u>			<u>Weston</u>		
i	15 33	40.0 ?	i	15 34	27
i		41.5	iS ₁		35 12
i		43.0			
i	34	10.0			
i		15.0			
i		19.0 max.			

Daniel Linehan, S.J.

NESA BULLETIN

May 1 - 15, 1939

Bulletin No. 21

***** (May 1) *****

Williamstown

i 18 52 05
i 08.5
i 12

These look like a strong S group starting with S₁ for a near quake. No sign of P₁.

***** (May 2) *****

Ottawa

i 15 19 15.5
i 16.3
F 19.7

Felt in Ottawa.

***** (May 4) *****

Fordham

i 13 58 35
i 39
i 49

Weston

e 13 59 51

***** (May 4) *****

Weston

iP₂ 21 10 55.0
iP₁ 55.5
i 56.5
e? 11 11.5
iS 12.6
iS₁ 13.5

iP₁ 22 10 55.0
i 58.7
e 11 11.1
iS₂ 11.8
iS₁ 13.5

Two blasts at Plainville, Conn., Δ = 139 km. (88 mi.)

***** (May 5) *****

Weston

iS₁? 16 28 07
iL₁ 09

iS₁ 23 31 20
iL 22

***** (May 6) *****

Weston

iP₁? 17 51 00
iS₁ 18.5

***** (May 9) *****

Weston

eP₁ 20 13 33.8
iP₁P₁ 34.8
i2(P₁P₁) 36.0
i 40.0
e 47.0
iS₁ 48.0
iS₁S₁ 49.6

$\Delta = 108$ km. (68 mi.)
H = 20 13 14.4

***** (May 10) *****

Weston

iP₁ 18 02 45.5
iP₁P₁ 47.0
i 55.2
i 57.0
iS 03 00.5
iL 07.0

$\Delta = 118$ km. (74 mi.)

***** (May 11) *****

Fordham

i 20 06 02 S phases of distant local ?

***** (May 12) *****

Weston

i 07 48 54

Fordham

i 07 48 57.2 Dil.
i 49 13.5 Deep focus

***** (May 12) *****



<u>Weston</u>				<u>Williamstown</u>				<u>Ottawa</u>			
iP ₂	11	44	39.9	iP ₂ ?	11	44	45.6	i	11	45	56
iP ₁			40.9	iP ₁ ?			46.8	i		46	01
i			42.2	i			57.6	i			04
iS ₂	45	00.0		iS ₂ ?	45	10.3		F		47	
iS ₁		02.5		iS ₁ ?		12.3					
				i		22.3					
$\Delta = \text{ca. } 175 \text{ km. (106 mi.)}$				$\Delta = \text{ca. } 210 \text{ km. (131 mi.)}$				<u>Fordham</u>			
H = 11 44 12.5								i	11	46	02

Compression to South
Appears to be a quarry blast near Conway, N.H.
No report from this area as yet.

***** (May 15) *****

<u>Weston</u>				<u>Williamstown</u>				<u>Ottawa</u>			
iP ₂	21	31	15.7	i	21	31	20.5	i	21	32	31.5
iP ₁			16.7	iP ₁ ?			21.7	i			37
i2P ₁ P ₁			18.9	i			44.8	i			40
iP ₁ S ₁			20.4	iS ₁ ?			49.2	F		33	
iS ₂			36.0	i			54.7				
i			37.2					<u>Fordham</u>			
iS ₁			38.0	$\Delta = \text{ca. } 210 \text{ km. (131 mi.)}$				i	21	32	45
i2S ₁ S ₁			41.5								

$\Delta = \text{ca. } 175 \text{ km. (106 mi.)}$
H = 21 30 47.5
Compression to South; location same as May 12 above.

NOTICE FROM:

Mass. Inst. of Tech.: Dr. Slichter reports the location of the blast of April 20, 1939 (at N. Branford, Conn.) as latitude 41°19'85" N., longitude 72°47'13" W., and the time of origin 20h00m03s03.

Daniel Linehan, S.J.

***** (May 16) *****

Fordham

i	19	21	58.6
i		22	02.3
i			04.8

***** (May 19) *****

Weston

i	18	35	35.3	Deep focus ?
i		36	03.2	
i			12.4	

***** (May 19) *****

Weston

iP ₂	18	46	41.2	$\Delta = \text{ca. } 206 \text{ km. (128 mi.)}$	iP ₁	19	22	22
iP ₁			42.9		iS ₁			46.3
iS ₂		47	04.7					
iS ₁			07.5					

***** (May 26) *****

Weston

i	20	26	12.1
i		27	02.1
i			04.2

Fordham

i	20	26	15.0	Deep focus
i		27	05.8	

***** (May 27) *****

Ottawa

i	03	19	17
i			20.5
i			25
i			28.5
i			34
F	20		ca.

***** (May 31) *****

Weston

iP ₁	17	10	50.1
iS ₁		11	06.2

Daniel Linehan, S.J.

NESA BULLETIN

June 1 - 15, 1939

Bulletin No. 23

***** (June 1) *****

Harvard

iP₁? 14 55 01
eS₂? 34
iS₁? 44

Δ = ca. 350 km. (219 mi.)
Az. E.

Weston

iP₁ 14 55 04.5
i 37.0
iS₁ 48.0

***** (June 2) *****

Harvard

iP₁ 20 28 54.8
P₁P₁ 55.7
iS₁ 29 07.8
S₁S₁ 09.5

Δ = 100.1 km. (63 mi.)

Blast at Southwick, Mass.

φ = 42°04'20" N,
λ = 72°42'30" W H = 20 28 38

Weston

iP₁ 20 28 57.1
iP₁P₁ 58.1
i 29 03.3
iS₁ 10.9
iS₁S₁ 12.2

Δ = 115 km. (72 mi.)

***** (June 3) *****

Ottawa

i 15 06 24
i 24.5
i 25.3
F 06.7

i 16 13 08
i 09
i 09.5
F 13.3

***** (June 6) *****

Fordham

i 16 00 46.5 ?
i 48.0
i 50.0
i 53.3 max,

***** (June 6) *****

Weston

iP₁ 21 04 42.5
iP₁P₁ 43.3
i 48.5
i 55.7
i 56.3
iS₁ 58.0

Az. = SE of Weston
 Δ = 127 km. (79 mi.)
H = 20 04 21.6

***** (June 9) *****

Weston

iS₁ 19 04 47

***** (June 10) *****

Ottawa

i 15 24 30
i 31
F 24.7

***** (June 13) *****

Weston

iP₁ 21 13 10.7
iP₁P₁ 11.6
i 17.0
i 23.8
i 24.7
iS₁ 25.9
iL 33.0

Az. = W.
 Δ = 122 km. (76 mi.)
H = 21 12 51

***** (June 15) *****

Fordham

iP₂ 19 00 21.5
i 22.4
i 22.8
i 24.0
iS₂ 40.2
i 42.8
i 43.0 max.
 Δ = 158 km. (99 mi.)

Weston

eP 19 00 28.4
iP₁ 30.3
i 31.1
iS 52.5
i 53.1
iS₁ 55.3
eL 01 10
 Δ = 210 km. (131 mi.)

Daniel Linehan, S.J.

NESA BULLETIN

June 16 - 30, 1939

Bulletin No. 24

***** (June 17) *****

Weston

i 19 29 11.0
i 31.8

Fordham

i 19 29 13 Deep focus ?

***** (June 19) *****

Ottawa

i 15 27 30.5
i 35.5
i 51.0
i 53.0
F 29

***** (June 19) *****

Weston

i 15 29 59.8

i 19 20 59

***** (June 19) *****

Harvard

e 21 47 31
eSn? 50 49
iS₂? 51 57
iS₁? 52 55
Δ order of 18°?
H about 21 43 25
(Very doubtful)

Weston

i 21 47 32.7
i 52 55.6
i 53 02.9

Fordham

e 21 49 58
i 51 47
e 49
eL 22 07.5

Activity on short period
lasts about six minutes.

***** (June 21) *****

Fordham

i 04 28 55

i 17 45 03 ?

- 2 -

***** (June 21) *****

Fordham

i 20 44 22.8
i 30.2
i 31.6
i 34.0
i 37.2

Weston

i 20 45 15

***** (June 21) *****

Weston

iP₁ 20 59 17.1
iP₁P₁ 17.8
i 24.0
iS₁ 29.0
iL 35.0

Fordham

i 21 00 56.9
i 58.2
i 59.1
i 01 01.8

Δ = 100 km.
(63 mi.)

Perhaps quarry blast east of Springfield, Mass.
Cf. NESA Bulletin No. 3, Aug. 2, 1938.

***** (June 23) *****

Ottawa

i 10 10 35
i 41
i 54
F 11.3

Weston

(No chronometer signals e 10 13 07
at these times)

***** (June 23) *****

Weston

eP₁ 14 38 59.3
iP₁P₁ 39 00.8
iS₁ 13.4
iL 20.3

Δ = 107 km. (67 mi.)

***** (June 24) *****

Fordham

e 11 32 28 Activity lasts about 1 1/2 min.

Weston

e 11 33 46

***** (June 24) *****

Fordham

iP₂ 15 09 56.0
iS₂ 10 17.4
i 19.0
i 19.5 max.
Δ = 182 km. (113 mi.)

Weston

eP₂ 15 09 59.8
iP₁ 10 01.7
iS₂ 24.9 Δ = ca. 220 km.
i 25.4 (137 mi.)
iS₁ 27.9

***** (June 24) *****

Ottawa

iP_n 17 21 26
i 35
i 47
i 55
iS_n 22 18
i 31
F 30
Δ = 485 km. (303 mi.)
H = 17 20.3
Felt at Baie St. Paul,
P.Q.

Weston

iP_n 17 21 35
iP₂ 46
iP₁ 53
i 22 12.5
i 17
i 20
i 22
iS_n 32
iS₂ 53
iS₁ 23 09
Compr. to South ?
Δ = 620 km. (387 mi.)

Fordham

i 17 23 41.5
i 46.8
i 56.0
i 08.0 max.
Activity started at
about 17 23 05,
lasted about five
minutes.

***** (June 26) *****

Ottawa

i 14 18 08
i 08.7
F 18.6

NOTICE FROM:

M. I. T. : Dr. Slichter reports the time at origin of the blast
near Hudson, N.Y., on June 15, 1939, as
18 59 57.62
and the coordinates as
42°13'61
73°46'70

Daniel Linehan, S.J.

IESA BULLETIN

July 1 - 15, 1939

Bulletin No. 25



***** (July 2) *****

Fordham

i 13 08 38 (?)

***** (July 2) *****

Weston

19 53 48.4

***** (July 3) *****

Weston

iP 07 44 42

***** (July 3) *****

Weston

iP 15 38 55.7

***** (July 3) *****

Fordham

i 15 39 44
i 49
i 54
i 59

"Note 5 seconds intervals"

***** (July 5) *****

Weston

i 11 37 59.1

***** (July 5) *****

Ottawa

i 13 52 43
i 43.5
F 53

***** (July 5) *****

Weston

i 23 09 04

***** (July 6) *****

Weston

i 01 23 36
i 01 25 06.6

***** (July 6) *****

Weston

e 07 41 06
i 12

***** (July 8) *****

Fordham

iP₂ 15 44 49.2 Dil.
i 51.0
iS₂ 45 06.9
i 11.0 Max.

$\Delta = 150 \text{ km.}$

Weston

iP₂ 15 44 59.2
iP₁ 45 01.2
2(P₁P₁) 02.0
i 16.0
S₂ 24.7
i 26.1
i 30.0

$\Delta = 220 \text{ km. (ca)}$

***** (July 8) *****

Fordham

i 21 38 01 Dil.
i 16 Deep

Weston

21 38 20.2

***** (July 10) *****

Weston

e 02 26 10.9
i 12.5

Fordham

i 02 26 12 Comp.

- 3 -

***** (July 10) *****

Weston

i 20 46 00.0
e 01.9
i 06.0

Fordham

i 20 48 43

Beginning of 'S' phase of
distant local.

***** (July 11) *****

Fordham

i 16 20 46 ?

***** (July 12) *****

Weston

iP 15 47 12.3

***** (July 15) *****

Ottawa

i 15 46 34
i 36
F 47

NOTICES FROM:

Williamstown:

***** (June 6) *****

iP₁ 21 04 36.4
iS₁ 45.3

***** (June 13) *****

i 21 13 04
04.5
06.8
13.7
15.5
20.3

NOTICES FROM:

Williamstown: (Continued)

***** (June 18) *****

eP _n	21	47	15
iS _n ?		50	57
i		51	37
i		52	23
iS ₁		52	34
i		52	57
i		53	11
iL ?		53	42

***** (June 21) *****

iP	20	59	13.0
iS ₁			21.6
i			24.4
iL			26.3

***** (June 23) *****

iP	20	44	37.2
i			56.2
iS ₁ ?			59.2

***** (June 24) *****

iS ₁ ?	11	33	14
-------------------	----	----	----

***** (June 24) *****

e	12	01	05
i		03	27
i		04	15

May be near

***** (June 24) *****

iP	17	21	37
i			42.5
i			53.8
iS		22	38.5
i			50.5
i			58.5
iS ₁ ?		23	08

$\Delta = 576 \text{ km. (ca)}$

Daniel Linehan, S.J.

July 16 - 31, 1939

Bulletin No. 26



***** (July 20) *****

Fordham

i 18 58 33.5
i 35.5
i 38.2
i 44.2 max.

i 20 13 16.2 ?
i 45.5
i 54.1 max.

***** (July 25) *****

Weston

i 07 36 55 Deep focus ?

Fordham

iP₂ 07 36 59.5

***** (July 25) *****

Fordham

iP₁ 20 00 17.5 Comp.
iS₁ 30.0
i 32.5 max.

Δ = 102 km. (64 mi.)

Blast at N. Branford,
Conn. Cf. Bull. 20,
April 20, 1939

Weston

eP₂ 20 00 26.5
iP₂ 27.0
i 37.3
iS₂ 46.9
iS₁ 48.4

Δ = 166 km. (103 mi.)

H = 20 00 00.5

***** (July 25) *****

Fordham

i 20 23 44.5
i 45.6
i 46.7
i 48.5 max.

***** (July 27) *****

Fordham

iP₂ 14 01 33.4
iS₂ 49.5
iS₁S₁ 51.3
i 52.7
i 54.5 max.
 Δ = 135 km. (85 mi.)

Weston

eS 14 02 57

Daniel Linehan, S.J.

NESA BULLETIN

August 1 - 15, 1939

Bulletin No. 27

Addenda to Bulletin No. 26

(Misplaced at the Central Station.)

***** (July 28) *****

Ottawa

i	13	42	59	i	14	55	00.5	i	16	11	51	i	19	25	59	i	21	22	00.5
i		43	00	i			01	i			52	i		26	00	i			01.5
F		43.4		F		55.5		F		12.2		F		26.5		F		22.4	

***** (August 1) *****

Weston

Fordham

i	16	07	44.7	iP	16	07	46	Comp.
i			54.2	ipP?		08	18	
i		08	15.9					

Deep focus

***** (August 1) *****

Weston

iP ₂	17	35	06.8	$\Delta = 152$ km. (95 mi.) ca. $H = 17$ 34 42.4 Azimuth West.
iP ₁			07.6	
i			23.0	
iS ₂			24.7	
iS ₁			25.6	

***** (August 5) *****

Fordham

Weston

iP ₂	15	36	02	Dil.	eP	15	36	04.2
iS ₂			23		iP ₂			05.8
iS ₁			25.5		iS ₂			29.0
i			26.5	max.	i			30.5

$\Delta = 180$ km. (112 mi.) $\Delta =$ ca. 210 km. (131 mi.)

Quarry blast somewhat north of Hudson, N.Y.?

***** (August 12) *****

Weston

iP ₂	15	38	58.7
iP ₁			59.4
i	39		14.7
iS ₂			16.5
iS ₁			17.3
iS ₁ S ₁			18.4

$\Delta = 149$ km. (94 mi.)

H = 15 38 34.6

Azimuth South West.

Daniel Linehan, S.J.

NESA BULLETIN

August 16 - 31, 1939

Bulletin No. 28

Addendum to Bulletin No. 27

***** (August 15) *****

Ottawa

P_n 08 37 36
P* 37
P_g 40
i 42
S_n 55
S_g 59
F 39.0

$\Delta = 160$ km. (100 mi.)

H = 08 37 10.3

***** (August 20) *****

Weston

i 07 27 13.5
i 31.7

***** (August 22) *****

Ottawa

i 17 35 03.5
i 04
F 36

i 19 40 24
i 24.5
F 41

***** (August 25) *****

Weston

e 15 20 01
i 02.2
i 04.4

***** (August 26) *****

Weston

iS 04 10 33.3
iL 44.1

iS 16 10 09.3
iL 18.4

***** (August 28) *****

Weston

i 16 36 19.5
iS 20.2
iL 29.6

***** (August 29) *****

Weston

i 11 44 13.4
iS 14.0
iL 23.6

eP 22 50 03
i 16.9
iS 17.5
iL 27.4

***** (August 31) *****

Ottawa

iPn 07 52 57
iP* 53 05
iSn 42 H = 07 51 58.6
i 55.5
i 58
F 55

iPn 08 02 59
iP* 03 07
iSn 44 H = 08 02 00
i 49.5
i 57.5
i 04 00
F 06

$\Delta = 415$ km. (259 mi.). Rock bursts at Kirkland Lake, Ont.

***** (August 31) *****

Weston

iP₁ 10 51 27.2 $\Delta = 127$ km. (79 mi.)
iS₁ 42.5 H = 10 51 06.3

Apparently a blast. There is a strong L group but its time of beginning is not clear. The disturbances reported for August 26, 28, 29 seem to be from the same source though of lesser amplitude.

NOTICE FROM:

Weston: Father Daniel Linehan will be absent from the Weston Observatory throughout the coming school year. During that time the NESa Bulletin will be compiled by Laurence C. Langguth, S.J.

Laurence C. Langguth, S.J.

NESA BULLETIN

September 1 - 15, 1939

Bulletin No. 29

Addenda to Bulletin No. 28

***** (August 20) *****

Fordham

iP 07 27 13 Deep focus

***** (August 22) *****

Fordham

iP₁ 20 56 42.8
iS₁ 45.0 $\Delta = 20$ km. (12.5 mi.)

***** (August 25) *****

Fordham

iP₂ 15 19 31.7
iS₂ 51.3 $\Delta = 170$ km. (106 mi.)

***** (August 28) *****

Fordham

iP₂ 15 07 44.0
iS₂ 08 03.0 $\Delta = 162$ km. (101 mi.)

***** (September 1) *****

Fordham

iP₂ 19 59 44.7 Dil.
iP₁ 45.5
iP₁S₁ 49.2
iS₂ 20 00 03.2
iS₁S₁ 06.0
 $\Delta = 155$ km. (97 mi.)
H = 19 59 19.5

Weston

iP₂ 19 59 51.8
iP₁ 53.6
i 56.7
iS₂ 20 00 15.8
i 16.6
iS₁ 19.2
iS₁S₁ 19.9
 $\Delta = 210$ km. (131 mi.)

Ottawa

i 20 00 23
i 01 02
iS₁? 07
F 02.0
 $\Delta = \text{ca. } 370$ km.
(230 mi.)

Probably a blast near Hudson, N.Y.

***** (September 2) *****

Ottawa

iPn	18	45	53	
i		46	02	
iSn			38	
i			52	
F	48			

$\Delta = 415 \text{ km. (259 mi.)}$
H = 18 44 55

***** (September 4) *****

Ottawa

iP*	05	17	13	
iPg			14.5	
i			17	
iS*			22	
F	19			

$\Delta = 77 \text{ km. (49 mi.)}$
H = 05 17 00
Felt at Kazabazua, P.Q.

***** (September 5) *****

Weston

iP ₂	22	23	43.4	$\Delta = 126 \text{ km. (79 mi.)}$	H = 22 23 22.6
eS			57.3	This and the following are further examples	
iS ₂			58.5	of the disturbances reported from this station	
iL	24	06.4		in the last Bulletin. They have been observed	

almost daily, but these two were selected for study because they were somewhat clearer than usual. The azimuth appears to be north and a little to the east, perhaps in the vicinity of Wolfboro, N.H.

***** (September 8) *****

Weston

iP ₂	16	21	35.3	
eS			49.7	$\Delta = 127 \text{ km. (79 mi.)}$
iS ₁			50.7	H = 16 21 14.5
iL			59.2	Cf. above, September 5, 22h.

***** (September 12) *****

Ottawa

i	20	12	23	i	20	46	19
i			24	i			20
F	13			F			46.8

***** (September 13) *****

Fordham

iP₁ 01 22 07.1
iS₁ 09.1 Δ = 18 km. (12 mi.) Felt in Union City, N.J.

***** (September 15) *****

Ottawa

i	18	27	18	i	21	11	53
i			19	i			54
F		28		F		12.4	

Laurence C. Langguth, S.J.

NESA B U L L E T I N
September 16 - 30, 1939

Bulletin No. 30



***** (September 16) *****

Fordham

iP₂ 18 17 11.8
iS₂ 33.9

$\Delta = 191$ km. (119 mi.)

Weston

eP 18 17 16 $\Delta = 219$ km. (137 mi.)
iP₁ 17.5 H = 18 16 41.3
iS₂ 41.0 $\phi = 42^{\circ}34'$ N. ca.
iS₁ 44.5 $\lambda = 73^{\circ}54'$ W. ca.
Albany County, N.Y.

***** (September 18) *****

Fordham

iP₂ 20 07 34.8
iS₂ 55.0
iS₁ 57.0 $\Delta = 170$ km. (106 mi.)
i2(S₁S₁) 59.5
i 08 02.5

***** (September 18) *****

Weston

iP₁ 20 08 49.6
iS₁ 09 03.7 $\Delta = 115$ km. (72 mi.)

***** (September 18) *****

Ottawa

i 20 36 46
i 37 01
F 37.5

***** (September 20) *****

Data for the disturbance on this day, reported by Ottawa, Williamstown, Weston, and Fordham, and of origin time about 03^h54^m44^s, will be given in a later Bulletin.

***** (September 20) *****

Ottawa

i 04 08 10
i 47
i 09.0
F 11

Weston

e 04 11 13 Trace only

***** (September 21) *****

Fordham

iP₁ 20 30 11.3
iS₁ 18.9
iS₁S₁ 20.4
i2(S₁S₁) 25.5
Δ = 60 km. (38 mi.)

Weston

eP₂ 20 30 40.5 Δ = 250 km. (156 mi.)
eP₁ 43.7 H = 20 30 01.3
iS₂ 31 09.6 φ = 41°25' N.
iS₁ 13.7 λ = 74°05' W.
Orange County, N.Y.

***** (September 23) *****

Ottawa

i 16 13 39
i 42
i 54
i 59
i 14 02
F 14.5

***** (September 28) *****

Fordham

i 18 13 15 Activity about 15 seconds. S phases of local?

***** (September 28) *****

Ottawa

i 19 06 20
i 25
i 36
F 07

***** (September 29) *****

Fordham

i 14 52 32 Activity about 15 seconds. S phases?

***** (September 29) *****

Weston

iP₁ 17 18 41.5
iS₁ 47.1
Δ = 47 km. (29 mi.)

***** (September 30) *****

Fordham

iS₂? 15 26 25.0
iS₁S₁? 26.5
i 28.0
Δ = 133 km. (83 mi.)

Interpretation very doubtful.

Weston

eS₂ 15 26 39 Δ = 189 km. (119 mi.)
i 40.8 H = 15 25 47
iS₁ 41.4 φ = 42°05' N. ca.
i₂(S₁S₁) 44.0 λ = 73°35' W. ca.

Columbia County, N.Y.

NOTICE FROM:

Fordham Bulletin No. 26, July 25, 07^h36^m59^s.5, read "iP" instead of "iP₂" (reported as iP₂ and read erroneously at Central Station.)

Bulletin No. 27, August 12, add -

iS₁S₁ 15 39 09.0
i₂(S₁S₁) 11.8 Δ = 115 km. (72 mi.) near
i 14.0 Middletown, Conn.

Laurence C. Langguth, S.J.

NESA BULLETIN

October 1 - 15, 1939

Bulletin No. 31

Addenda to Bulletin No. 30

***** (September 16) *****

Williamstown

i 18 17 00
iS 03.5

***** (September 20) *****

Ottawa

iP_n 03 55 46
iP₂ 55
iS_n 56 33.5
iS₂ 46
iS₁ 57 00
 $\Delta = 465$ km. (290 mi.)
H = 03 54 43

Williamstown

iP_n 03 56 30.5
iP₂ 48
iS_n 58 00.5
iS₂ 25.5
 $\Delta = 858$ km. (535 mi.)
H = 03 54 41.5

Weston

iP_n 03 56 45.7
iP₂ 57 10
iS_n 58 27
iS₂ 58
iS₁ 59 31
 $\Delta = 985$ km. (615 mi.)
H = 03 54 41

Fordham

iP_n 03 56 47
iS_n 58 30
iS₂ 59 00

$\phi = 48^{\circ}30'$ N.

$\lambda = 80^{\circ}34'$ W.

$\Delta = 995$ km. (621 mi.)
H = 03 54 42.3

By Leet's Harvard Travel Times for New England,
extrapolated.
(Solution by James J. Devlin, S.J.)

***** (September 21) *****

Williamstown

iP₂? 20 30 27
iP₁ 29.4
iS₂? 45.4
iS₁ 47.7

***** (October 1) *****

Ottawa

i 08 33 38
i 47
F 35

***** (October 2) *****

<u>Fordham</u>	<u>Williamstown</u>	<u>Weston</u>
i 16 05 26.0	iS ₁ ? 16 06 18	i 16 06 37.4
i 30.2		i 46.2
i 35.2		i 48.2
i 39.6		
i 43.3		

All seem S phases. Az. SW of Fordham

***** (October 4) *****

Ottawa

i 13 18 46
i 19 02
F 19.3

***** (October 4) *****

<u>Fordham</u>	<u>Weston</u>
iP ₂ 16 11 36.4	iS 16 13 03.1
iP ₁ P ₁ 37.6	
iS ₂ 54.0	
iS ₁ S ₁ 55.8	
i 12 00.7	
i 01.6	
i 03.0	

Δ = 160 km. (100 mi.)
Az. SW of Fordham

***** (October 5) *****

<u>Fordham</u>	<u>Weston</u>
iP ₂ 13 00 56.8 Dil.	eS 13 02 22
iS ₂ 01 13.5	

Δ = 138 km. (87 mi.)

***** (October 6) *****

<u>Weston</u>	<u>Fordham</u>
i 02 14 14.5	i 02 14 15 Deep focus

***** (October 6) *****

Weston

iP₁ 21 59 28.7
iS₁ 32.4 $\Delta = 30$ km. (19 mi.)

***** (October 8) *****

Weston

iP₂? 00 49 00
iS₂ 27.0 $\Delta = 235$ km. (147 mi.)
iS₁ 30.9 Doubtful. P phases very weak.

***** (October 8) *****

Fordham

iP₁ 21 07 56.8 Comp. $\Delta = 54$ km. (34 mi.)
iS₁ 08 03.5 Earth periods unusually long.

***** (October 9) *****

Williamstown

iS₁? 19 13 31

***** (October 10) *****

Weston

iP₁ 17 16 55.6
iP₁P₁ 56.7 $\Delta = 46$ km. (28 mi.)
iS₁ 17 01.3

***** (October 10) *****

Fordham

iP₂ 21 21 57.2 Dil.
iP₁P₁ 59.0
i? 22 14.0
i? 17.2
iS₂ 17.5
i 18.5 max.

$\Delta = 175$ km. (109 mi.)

Weston

iS 21 22 32.3
i 35.4
i 41.5

***** (October 10) *****

Fordham

i 21 25 05 Dil.
e 17

Weston

i 21 26 00 S phases.

***** (October 11) *****

Weston

iP₁ 18 49 17.6
iP₁P₁ 18.2
i₂(P₁P₁) 21.8
iS₁ 24.4
iS₁S₁ 26.6
iL 28

$\Delta = 55.5$ km. (34 mi.)

H = 18 49 08.4

$\phi = 42^{\circ}53'$ N.

$\lambda = 71^{\circ}25'$ W.

Williamstown

iP₁ 18 49 31
iS₁ 47

$\Delta = 136$ km. (85 mi.)

Felt in Derry, Londonderry, and
Manchester, N.H.

Laurence C. Langguth, S.J.

NESEA BULLETIN

October 16 - 31, 1939

Bulletin No. 32

***** (October 19) *****

<u>Ottawa</u>	<u>Weston</u>	<u>Williamstown</u>
iPn 11 55 06	iPn 11 55 18	ePn 11 55 20
iSn 56 00		iPn 22.5
$\Delta = 502$ km. (313 mi.)		iP2? 36
H = 11 53 56	<u>Fordham</u>	iP1? 46
		iSn 53 or 56
Evidence of damage	iP 11 55 46 Dil.	(very doubtful)
in Quebec-Saguenay	i 57 17	
Region.	i 24	
	i 58 19	

Approximate location as worked out by Weston

$\phi = 48^{\circ}3$ N.

$\lambda = 70^{\circ}7$ W.

The U.S. Coast and Geodetic Survey gives as provisional epicentre 48° N. and 70° W.

The Dominion Observatory, at Ottawa, is collecting instrumental and other data on this quake which is being made the subject of special study.

***** (October 19) *****

<u>Ottawa</u>
e 13 14 20
i 33
i 38
F 15.8

***** (October 19) *****

<u>Weston</u>	
eS 14 15 03.5	Does not appear to be deep focus; fairly strong
iS 08.3	on horizontal components.

***** (October 19) *****

Ottawa

i 17 38 22
i 39 09
i 21
i 26
F 40

***** (October 19) *****

Weston

eS 18 39 46
iS 55.3

As above 14 15 03.5 ~~does~~ does not appear to be
deep focus; fairly strong on horizontal components.

***** (October 21) *****

Ottawa

iP₂ 08 08 12
iP₁ 17.5
iS₂ 09 02
iS₁ 13
i 19
F 17

$\Delta = 435$ km. (272 mi.)

$\phi = \text{ca. } 47^{\circ}30' \text{ N.}$

$\lambda = \text{ca. } 70^{\circ}55' \text{ W.}$

Weston

e 08 09 00
e 08
iS₁ 48.1
i 56.6
 $\Delta = 562$ km. (351 mi.)

Williamstown

e 08 09 14.5
iS₁ 48.5
 $\Delta = 565$ km. (353 mi.)

Fordham

e 08 10 37 ?
iS 11 03
 $\Delta = 820$ km. (512 mi.)

***** (October 21) *****

Williamstown

iP₁ 08 59 46.0
iS₁ 54.2
 $\Delta = 68$ km. (43 mi.)
 $\phi = \text{ca. } 43^{\circ}3' \text{ N.}$
 $\lambda = \text{ca. } 73^{\circ}3' \text{ W.}$

Weston

iP₂ 09 00 08.0
iP₁ 09.3
i 19.5
i 28.3
iS₂ 30.8
iS₁ 33.5

Fordham

iP 09 00 14
iS 45
i 47
i 54
 $\Delta = 275$ km. (172 mi.)

Felt in Glens Falls, N.Y. $\Delta = 198$ km. (124 mi.)

Times do not agree for common H; average value appears to be about
08 59 33. Williamstown reports two earlier phases, e 08 59 20
and i 08 59 27.5, which may be parts of preliminary tremors too
weak to reach the other stations.

***** (October 21) *****

Fordham

iP2 19 16 44
iS2 17 05
i 10
i 15

$\Delta = 180$ km. (112 mi.)

$\phi = \text{ca. } 42^{\circ}30'$ N.

$\lambda = \text{ca. } 73^{\circ}50'$ W.

Weston

iP2 19 16 48.5
iP1 50.1
iS2 17 13.2
iS1 16.7

$\Delta = 212$ km. (132 mi.)

H = 19 16 14.5

Probably blast, north of Hudson, N.Y.

Ottawa

iP1 19 17 14
iS2 50
i 53
i 55

F 19

$\Delta = 360$ km. (225 mi.)

***** (October 24) *****

Ottawa

i 17 15 53
i 54
F 16.3

i 18 16 36
i 37
F 17

i 19 01 24
i 25
F 01.5

***** (October 25) *****

Fordham

iP2 14 47 06.0
iS2 26.0
iS1 28.2

$\Delta = 170$ km. (106 mi.). Felt in Hudson, N.Y.;
no blasting in cement quarry there at that time.

***** (October 25) *****

Weston

iS? 14 48 37.0
iS? 38.5

***** (October 26) *****

Ottawa

i 17 55 39
i 56 15
i 29
i 32
F 58

Weston

e 17 59 43
i 47

***** (October 27) *****



International
Seismological
Centre

Ottawa

iP 01 37 44
iP* 55
i 38 02
iS 38
iS* 53
F 54

$\Delta = 502$ km. (313 mi.)

H = 01 36 36

$\phi = \text{ca. } 48^\circ$ N.

$\lambda = \text{ca. } 70^\circ 4$ W.

Weston

eP 01 37 57
iPn 59.5
iP2 38 14.5
iP1 21
iSn 39 06.5
iS2 22.5
iS1 44.5

$\Delta = \text{ca. } 640$ km. (400 mi.)

Fordham

i 01 39 16
iS 40 00
i 16
i 33 max.

$\Delta = \text{ca. } 855$ km. (534 mi.)

Aftershock of Quebec Saguenay quake October 19.

***** (October 27) *****

Weston

iP1 21 12 41.3
iP1P1 42.3
iS1? 54.5
i 56.4
i 58.9

$\Delta = 110$ km. (69 mi.) Apparently a blast, but not clear.

NOTICES FROM:

Weston: The blasts reported by this station in Bulletin 28, August 26, 28, 29, 31, and Bulletin 29, September 5, 8 have been located at a dam project about two miles above Franklin, N.H. The distance from Weston is about 77 miles and from Williamstown about 90 miles.

Williamstown: For several of the above blasts:

Sept. 5 iP 22 24 07 Sept. 6 iP 17 45 51
iS 24 S-P = 17.0

Sept. 8 iP 16 21 40 Sept. 9 iP 16 11 13.3 $\Delta = \text{ca. } 143$
iS 57 iS 30.3 km. (90 mi.)

Sept. 14 iP 16 07 08.3 Sept. 15 iP 19 10 43.6
i 11.1 i 46.1
i 22.5 i 57.8
iS 25.3 iS 11 00.7

$\Delta = \text{ca. } 143$ km. (90 mi.)

Weston: In Bulletin 30, September 18, omit "iP1 20 08 49.6, $\Delta = 115$ km." and consider the phase iS1 20 09 03.7 as part of the disturbance reported by Fordham at 20 07 34.8. The azimuth will then be SW of Fordham. Cf. Bulletin 31, October 2, 16^h and October 4, 16^h.

Laurence C. Langguth, S.J.

November 1 - 15, 1939

Bulletin No. 33

International
Seismological
Centre

***** (November 2) *****

Ottawa

i 17 02 23.5
i 24
F 03

***** (November 2) *****

Fordham

iP₁ 17 03 03.2 Dil.
iS₁ 15.5
i2S₁S₁ 20.5
i 24.2
 $\Delta = 101 \text{ km. (63 mi.)}$

Weston

e 17 04 24
iS₁? 35.9
i 40.5
 $\Delta = \text{ca. } 370 \text{ km. (231 mi.) ?}$
Azimuth SW of Fordham ?

***** (November 2) *****

Ottawa

i 18 17 16
i 17
F 17.5

i 19 34 15
i 16
F 34.6

i 20 40 59
i 41 00
F 41.3

***** (November 2) *****

Fordham

i 21 09 39
i 43.5

***** (November 3) *****

Fordham

20 40 46 ?
i 41 02.0
i 05.1
i 06.7
i 08.0 max.

Weston

e 20 42 13
iS 14

***** (November 7) *****

Ottawa

i 02 41 49
i 42 46
F 45

Weston

e 02 43 17
iS 24

***** (November 8) *****

Weston

e 05 06 43
i 52.9

Fordham

i 05 06 58 ?

***** (November 8) *****

Ottawa

iP_n 06 04 10.5
i 15
iS_n 35
F 08

$\Delta = 213 \text{ km. (133 mi.)}$

H = 06 03 38

***** (November 11) *****

Ottawa

i 12 53 05
i 18
F 54.5

***** (November 11) *****

Fordham

iP₂ 19 16 25.0
i 29.5
iS₂ 43.1
i 45.8
i 48.0 max.
 $\Delta = 152 \text{ km. (95 mi.)}$
H = 19 16 00.3

Weston

eP_n 19 16 32.6
iP₂ 33.9
iP₁ 35.3
iS₂ 57.4
iS₁ 17 00.0
 $\Delta = 203 \text{ km. (127 mi.)}$
H = 19 16 01.2

Quarry blast at
Hudson, N.Y.

***** (November 15) *****

Fordham

iP₂ 02 54 15.6 Comp.
iP₁ 16.6
i2P₁P₁ 18.3
iS₂ 35.1
 $\Delta = 165 \text{ km. (103 mi.)}$

Williamstown

iP_n 02 54 41.8
iP₂ 49.5
iP₁ 52.6
iS_n 55 23.3
i 29.8
i 35.0
 $\Delta = 380 \text{ km. (237 mi.)}$

Weston

eP_n 02 54 49
iP₂ 55
iP₁ 55 00.5
i 02.4
iS_n 31.5
iS₂ 42.5
i 50.0
iS₁ 52.5
 $\Delta = \text{ca. } 425 \text{ km.}$
(266 mi.)

***** (November 15) ***** (Cont'd)

Ottawa

iP₂ 02 55 31
i 56 02
i 32
iS₂ 43
i 46
F 59

H = 02 53 49

ϕ = ca. 39°26' N.

λ = ca. 74°30' W.

Felt in Southern New Jersey and neighboring
States.

Δ = 665 km. (415 mi.)

***** (November 15) *****

Fordham

i 19 52 00 S phases of distant local ?

Laurence C. Langguth, S.J.

NESA BULLETIN
November 16 - 30, 1939

Bulletin No. 34



***** (November 17) *****

Fordham

iP? 19 35 25
iS 38

Weston

i 19 36 47 Trace several
i 49.5 seconds earlier.

***** (November 18) *****

Fordham

iP 02 33 03.5
iS 33.5 Felt in Baltimore,
i 35.5 Md.
i 41.0 $\Delta = 167$ miles.

Weston

e 02 34 50 Trace only
Fairly strong microseisms.

***** (November 22) *****

Fordham

iPn 03 32 15
iSn 35 31 $\Delta = \text{ca. } 17^{\circ}4$

Weston

iPn 03 32 28
iSn 35 46 $\Delta = 17^{\circ}6$

Cf. NESA Bulletin No. 17, Supplement.

***** (November 23) *****

Fordham

iP 15 17 51 Dil.
i 18 16
i 24
i 47
i 19 52
i 20 06
i 21 25
i 21 46 Max.
e 49 (Galitzin)

Weston

e 15 18 40
i 20 57.5
i 21 30.5
i 38.5
iS? 22 32
Epicentre in vicinity of St. Louis,
Mo.

***** (November 25) *****

Ottawa

i 17 51 39
i 48
i 51
e 52 09
F 53

***** (November 26) *****

Fordham

i 06 34 57
i 35 30 Deep focus

Weston

Trace only, on Z short period;
illegible because of very severe
microseisms.

***** (November 26) *****

Ottawa

i 19 01 18
i 19.5
i 33
i 42
i 51
F 04

***** (November 28) *****

Weston

i 02 16 33.0 Deep focus ?
i 53.5

***** (November 29) *****

Weston

i 12 28 19.1
i 23.9
i 27.8

Laurence C. Langguth, S.J.

NESA BULLETIN

December 1 - 15, 1939

Bulletin No. 35

Addendum to Bulletin No. 33

***** (November 15) *****

Harvard

iP	20 41	29.0	
i		30.2	
i		42.4	
iS		43.7	
iM		48.7	

S - P = 14^s7
 Δ = 120 km. (75 mi.)
H = 20 41 09.0

Addenda to Bulletin No. 34

***** (November 16) *****

Harvard

iM 12 16 25

***** (November 17) *****

Harvard

i	19 36	31.4		iP	21 01	54.5	
i		37 10		i		02 06.5	
i		14.9		i		08.0	
i		15.5		iM		15	

S - P = 13^s5
 Δ = 109 km. (69 mi.)
H = 21 01 36.2

***** (November 18) *****

Harvard

iS₁? 02 35 13
Felt in vicinity
of Baltimore.

iM 09 44 19

iM 13 41 08.5

***** (November 20) *****

Harvard

iM 19 51 57

iM 22 20 33



***** (November 22) *****

Harvard

iP	21	15	57	S - P = 8 ^s Δ = 65 km. (41 mi.) Microseisms very large. H = 21 15 46.2
iS		16	05	
iM			07	

***** (November 24) *****

Harvard

iM ₁	15	47	53
iM ₂			55

***** (November 28) *****

Harvard

iS	12	48	01.2
iM			04.2

***** (November 29) *****

Harvard

iP	19	58	50.0	Δ = 185 km. (115 mi.) H = 19 58 20.5	iM	15	15	51
iS		59	10.7		iM	17	11	02

***** (December 1) *****

Ottawa

i	16	39	13.5	i	16	43	43	i	19	23	05	i	19	28	23
i			15	i			44.5	i			06.5	i			24.5
F		40		F		46		F		23.7		F		29	

***** (December 1) *****

Harvard

iP ₂	19	32	17
iS ₂			38.3
iM			39.6

Δ = 180 km. (112 mi.)
H = 19 31 48.3
Large microseisms make interpretation doubtful.

Weston

iP ₂	19	32	20.5
eS _n			42
iS ₂			43.5
i			45.6

Δ = ca. 200 km. (125 mi.)
Stations too close and data too unreliable for determination of epicentre.

***** (December 1) *****

Fordham
iP₁ 21 16 18.5 Comp.
iS₁ 26.1
iS₁S₁ 28.2
i 30.1
i 33.6 max.
 $\Delta = 63$ km. (40 mi.)
H = 21 16 08

Harvard
iP₂ 21 16 46
i 09
iS 12
iM 27
 $\Delta = \text{ca. } 240$ km. (150 mi)

Weston
iP₁? 21 16 50
e 17 11.5
i 15.6
20.5
 $\Delta = \text{ca. } 250$ km. (156 mi)

Probably quarry blast in Orange County, N.Y.

***** (December 1) *****

Ottawa
i 21 36 33
i 34
F 37

i 21 42 05
i 06.5
F 42.7

***** (December 2) *****

Weston
e 08 53 33.6
i 50.3
i 56.3
i 54 00.3

Harvard
eM 08 53 43

***** (December 2) *****

Ottawa
iP* 20 25 27
iP_g 28
iS* 36
F 28
 $\Delta = 76$ km. (47 mi.)
H = 20 25 14

Weston
e 20 27 18
iS? 28.3
i 31.8
 $\Delta = \text{ca. } 500$ km.?

***** (December 5) *****

Harvard
iM 20 30 50

Weston
i 20 30 51.0

***** (December 5) *****



Weston

iP₁ 21 14 34.1
 iS₁ 34.8
 i 35.3
 i 36.8
 $\Delta = 6$ km. (3.5 mi.)

Harvard

iM 21 14 42
 $\Delta = 26$ km. (16 mi.)
 H = 21 14 33

Dynamite blast on nearby aqueduct job.

***** (December 8) *****

Ottawa

i 01 19 03
 i 09
 i 48
 i 20 03
 F 22

Weston

e 01 20 29
 i 36
 i 41.7

Does not appear to be deep focus;
 probably S phases.

***** (December 11) *****

Fordham

e 02 09 18
 e 12 47

Harvard

e 02 09 29
 e 13 22
 Microseisms obscure
 traces

Weston

e 02 09 28
 e 13 22
 First motions obscure
 by R.R. train.

Δ order of 16° - cf. NESA Bulletin No. 17, Supplement.

***** (December 11) *****

Weston

e 02 29 15

Harvard

e 02 29 50

***** (December 11) *****

Weston

e 17 26 14
 i 18

e 17 47 16
 i 47
 i 53
 i 48 01.5

Both disturbances last for about 1 1/2 minutes.

***** (December 12) *****

Fordham

iP₂ 17 24 40.3 Dil.
 iS₂ 59.8
 $\Delta = 167$ km. (105 mi.)
 H = 17 24 13.6

Weston

eP₂ 17 24 47.0
 iP₁ 47.5
 iS₂ 25 10.3
 $\Delta = 205$ km. (128 mi.)

Quarry blast north of Hudson, N.Y.?

Laurence C. Langguth, S.J.

NESA BULLETIN

December 16 - 31, 1939

Bulletin No. 36

***** (December 17) *****

Weston

e 07 49 09
i 22
i 55.5

Fordham

i 07 49 11
i 33

***** (December 17) *****

Weston

e 08 08 13.5
i 16
i 35.5

Fordham

i 08 08 19
i 37

***** (December 18) *****

Fordham

eP 10 40 05
i 43 11

Weston

e 10 40 07.5
i 43 12.6

***** (December 18) *****

Ottawa

i 12 29 28
i 30 08
i 10
i 15
F 33

***** (December 19) *****

Fordham

iP_n 15 03 54
iS_n 04 22
i 26
i 37

$\Delta = 250$ km. (156 mi.)
Az. SW of Fordham?

Weston

eS_n? 15 05 13
eS₂? 27.3
iS₁? 39.7

$\Delta =$ ca. 490 km. (306 mi.)

***** (December 19) *****

Fordham

iP₂ 18 21 18
iS₂ 42 $\Delta = 205$ km. (128 mi.)

***** (December 19) *****

Fordham

iP₂ 19 50 57
iS₂ 51 16 $\Delta = 161$ km. (100 mi.)

***** (December 20) *****

Ottawa

iP 13 22 16
i 24 59
F 30

Weston

iP 13 22 30.2
i 36.0
ipP? 25 10.3

Fordham

iP 13 22 31
i 36

Deep focus.

***** (December 24) *****

Fordham

eP 18 59 10
iP 24
iS 19 03 20
i 28
i 44

Weston

eP 18 59 40
eS 19 03 40
e 22 00

Δ order of 22°
Cf. Bulletin No. 17,
Suppl.

***** (December 25) *****

Weston

e 10 31 43
i 32 00
i 12

Perhaps S phases; possible activity for about ten
seconds preceding the first e phase read.

***** (December 27) *****

Fordham

i 03 00 31
i 38
e 24 19

These may not be connected.

Weston

i 03 00 16.5 Very heavy microseisms

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